Chapter 27

Polybutylene Terephthalate (PBT)

Category: Polyester, Thermoplastic

General Description: Thermoplastic polyesters are comparable in properties to Nylon 6 and 66 but have lower water absorption and higher dimensional stability. Most PBT is sold in the form of filled and reinforced compounds for engineering applications.[1004]

Processing Method: Melt processable.

Applications: Packaging, automotive, electrical, and consumer markets.

Permeability: The barrier properties of BASF Ultradur B 4550 film can be greatly improved by vacuum metallizing with aluminum.

Permeability Data by Material Supplier Trade Name: See Table 27-01.

Table 27-01. Water Vapor, Nitrogen, Oxygen, and Carbon Dioxide Through BASF AG Ultradur Polybutylene Terephthalate

Material Family	POLYBUTYLENE TEREPHTHALATE			
Material Supplier/Grade	BASF AG ULTRADUR B 4550			
Reference Number	180			
MATERIAL CHARACTERISTICS				
Sample Thickness (mm)	0.25			
TEST CONDITIONS				
Penetrant	water vapor	nitrogen	oxygen	carbon dioxide
Temperature (°C)	23			
Relative Humidity (%)	85%-0% gradient	50		
Test Method	DIN 53122	DIN 53380		
Test Condition Note	standard laboratory atmosphere			
PERMEABILITY (source document units)				
Gas Permeability ($cm^3/m^2 \cdot day \cdot bar$)		12	60	550
Vapor Transmission Rate ($g/m^2 \cdot day$)	10			
PERMEABILITY (normalized units)				
Permeability Coefficient ($cm^3 \cdot mm/m^2 \cdot day \cdot atm$)		3.04	15.2	139
Vapor Transmission Rate ($g \cdot mm/m^2 \cdot day$)	2.5			

Chapter 36

Low Density Polyethylene (LDPE)

Category: Polyolefin

General Description: With the density range of 0.910 to 0.925 g/cu cm, low density polyethylenes are available as base resins, and some grades with additive packages.

Processing Methods: Extrusion coating, extrusion, rotational molding, injection molding, blow molding, blown films, and cast films.

Applications: Extrusion coatings: liquid packaging, milk cartons, flexible and snack food packaging, and multi-wall bags.

Industrial packaging: shrink films, housewares, and personal care squeeze bottles.

See Ch. 34, *Polyethylene - Overview* for more information.

Permeability Data by Material Supplier Trade Name: See Tables 36-01 through 36-10 and Graphs 36-01 through 36-02.

Table 36-01. Water Vapor, Carbon Dioxide, Oxygen, and Ethylene Oxide Through Low Density Polyethylene

Material Family	LOW DENSITY POLYETHYLENE (LDPE)			
Product Form	FILM			
Features	2.5 blow up ratio			
Manufacturing Method	blown film			
Reference Number	216			
MATERIAL CHARACTERISTICS				
Density	0.920 g/cm³			
Melt Flow Index	4 g/10 min			
Sample Thickness (mm)	0.05			
TEST CONDITIONS				
Penetrant	water vapor	carbon dioxide	oxygen	ethylene oxide
Test Method	JIS Z0208	ASTM D1434		
PERMEABILITY (source document units)				
Vapor Transmission Rate (g · 100 µm/m² · day)	25			
Gas Permeability (cm³ · 100 µm/m² · day · atm)		7900	1500	21,000
PERMEABILITY (normalized units)				
Permeability Coefficient (cm³ · mm/m² · day · atm)		790	150	2100
Vapor Transmission Rate (g · mm/m² · day)	2.5			